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Potsch et al.

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[54] **SLITTER FOR DISPLAY PACKAGES AND SIMILAR PRODUCTS**

[75] Inventors: **George Potsch,** Lake Zurich; **Karl Friedrich Poetsch,** McHenry, both of Ill.

[73] Assignee: **Sun Industries Incorporated,** Fox Lake, Ill.

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[52] **U.S. Cl.** **83/449,** 83/425.4, 83/477.2, 83/496, 83/500

[51] **Int. Cl.** **B26d 1/24,** B26d 7/06

[58] **Field of Search** .. 83/420, 421, 433, 471, 477.2, 83/478, 482, 496, 925 MG, 925 R, 278, 435, 449, 401, 425–425.4, 500; 146/98; 143/38 A

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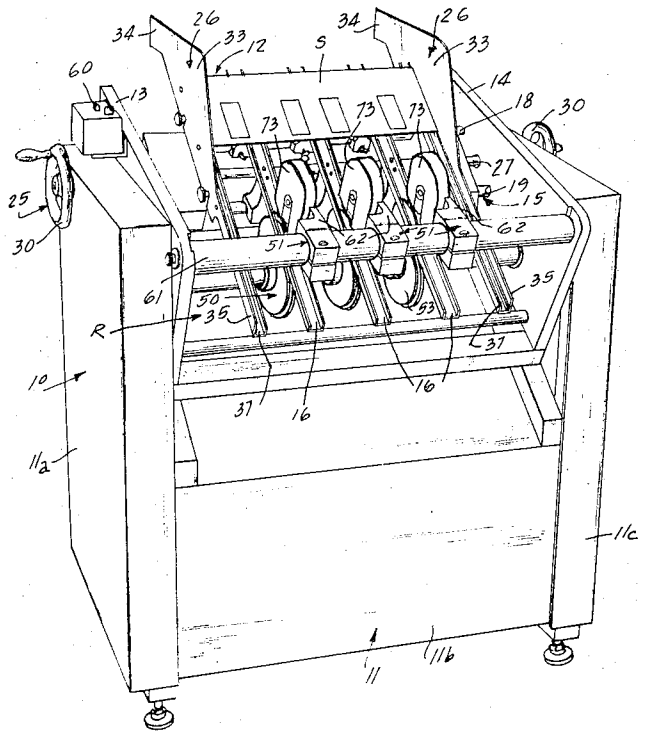
Primary Examiner—Frank T. Yost

Attorney, Agent, or Firm—Hill, Sherman, Meroni, Gross & Simpson

[57] **ABSTRACT**

An apparatus for slitting sheets of material comprising a frame having an inclined flat stationary feed bed which is fixedly mounted on the frame. The bed includes a series of transversely spaced inclined rails and each rail is provided with a knife opening located intermediately relative to upper and lower ends of each rail. Cutting means are also supported on the frame and comprise a paired knife and anvil with each pair co-acting at each knife opening thereby providing a series of transversely spaced slitting stations for slitting a sheet as it moves downwardly along the inclined flat feed bed on the aforesaid rails. The lower ends of the rails extend beneath and below the slitting stations to support the sheet before and after slitting. Each paired knife and anvil are so constructed to shear cut the sheet and the knives are self-sharpening because of the manner in which they are mounted relative to the anvils. Product support guides are positioned between the inclined rails for supporting the contents contained within the "blisters." A first sheet is employed carrying the blisters. The blisters in effect comprise a series of transparent open-ended pouches which are adapted to receive product and a closure sheet is secured to the first sheet to seal the product within the blister. The guides are used where the products being packaged are relatively heavy in weight.

12 Claims, 9 Drawing Figures



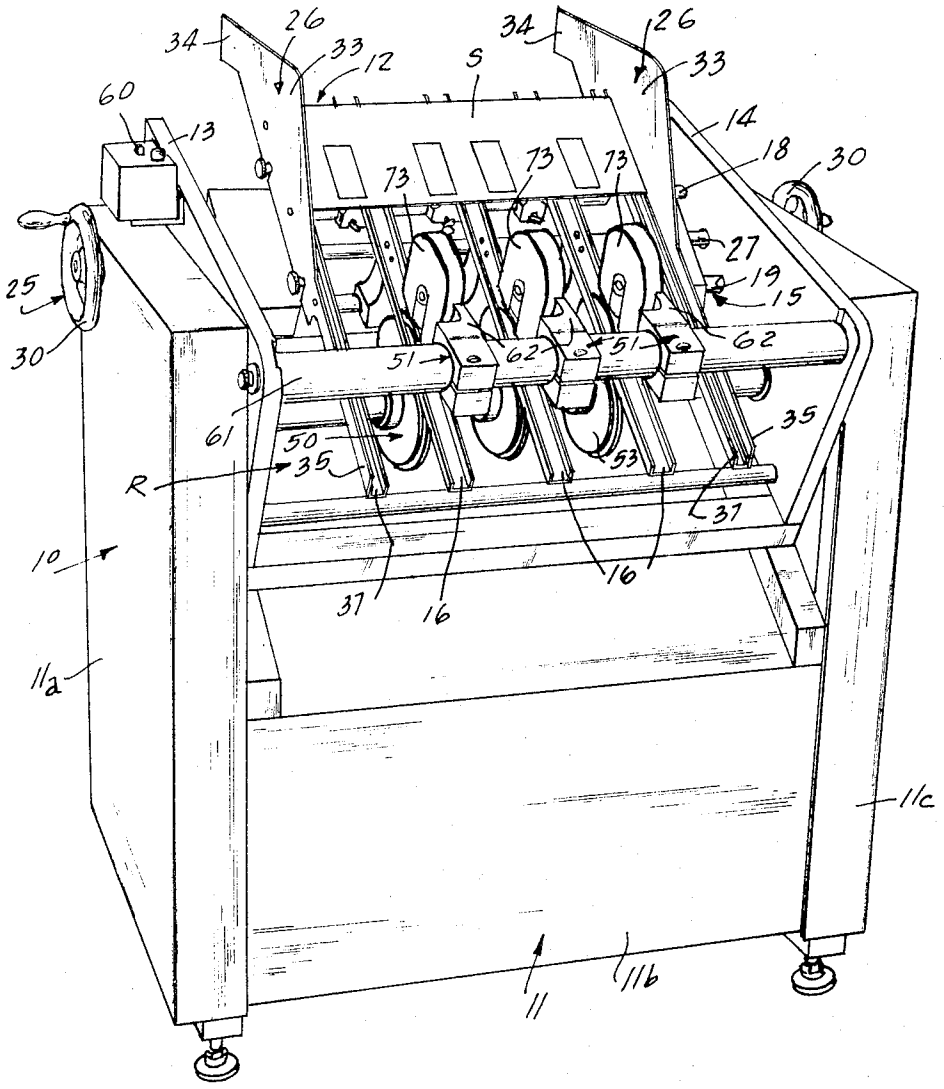

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Fig. 1

Fig. 2

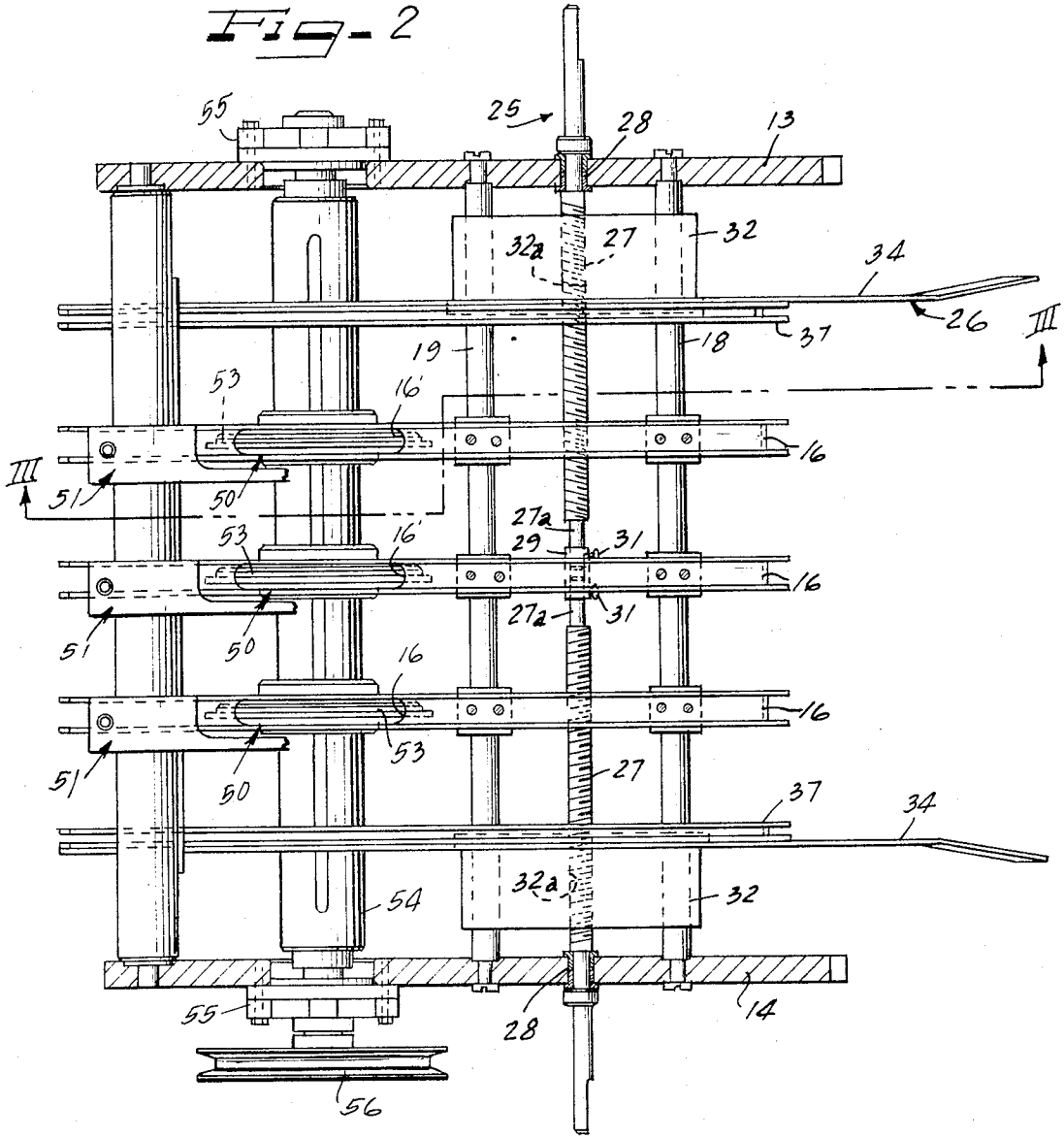

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Fig. 3

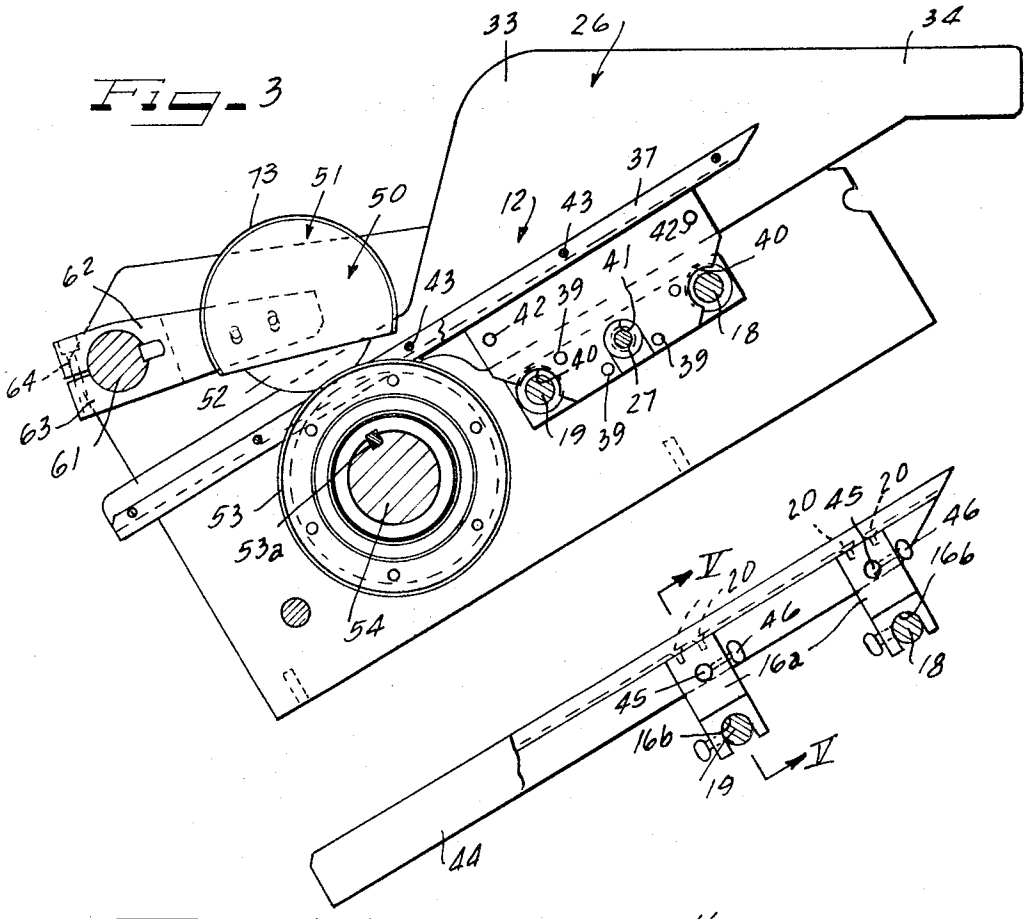


Fig. 4

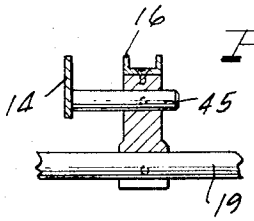


Fig. 5

Fig. 6

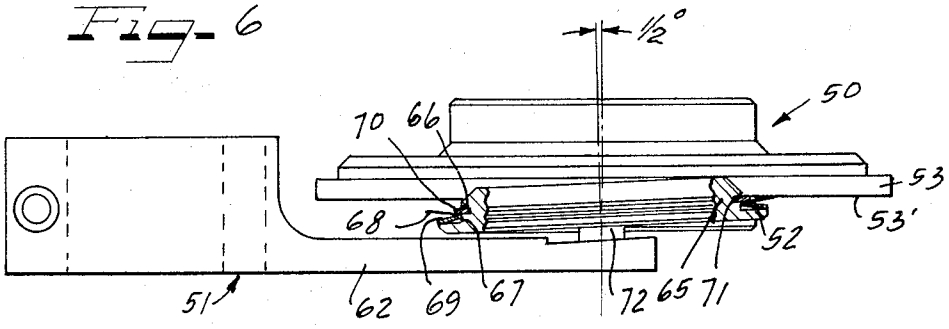


Fig. 7

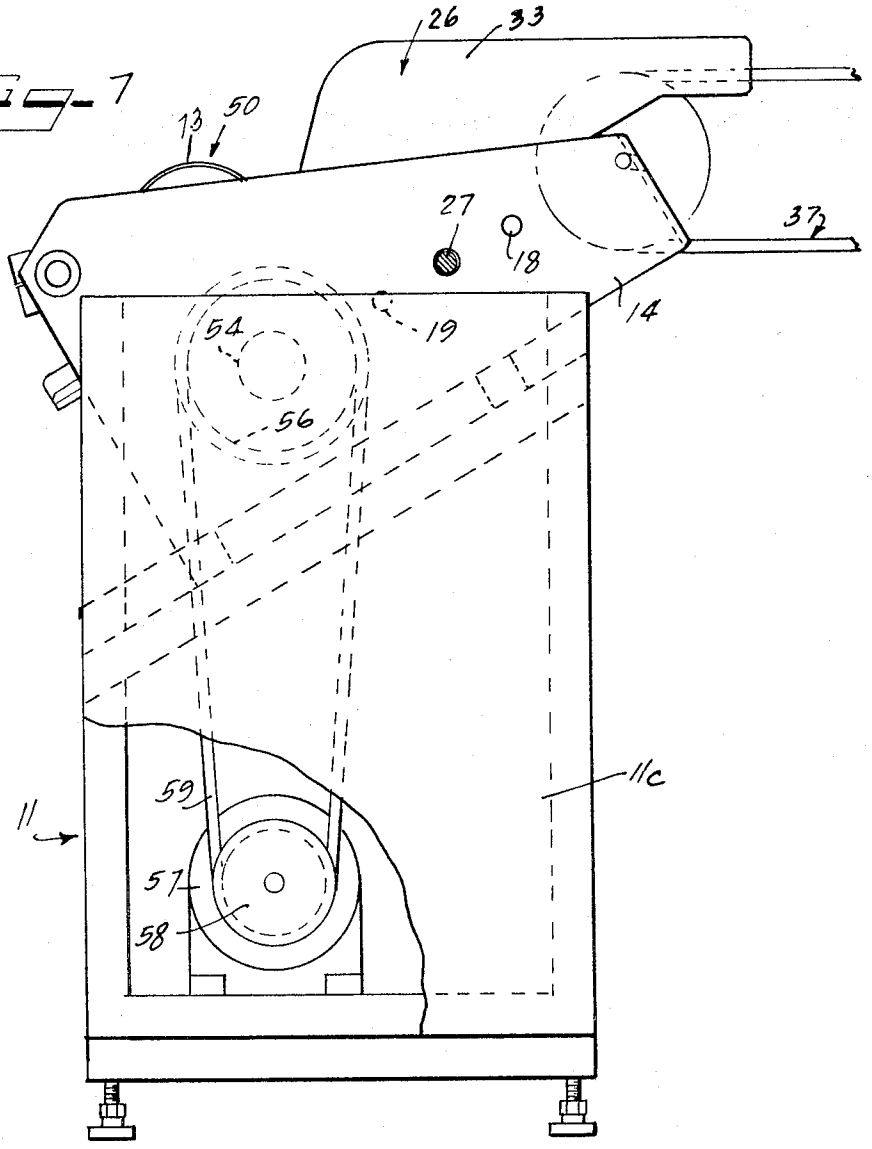


Fig. 8

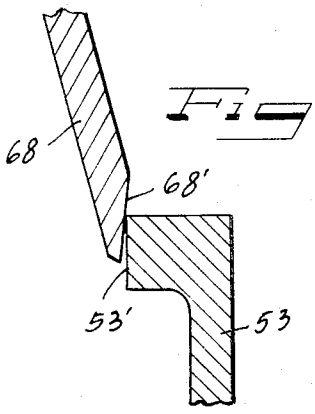
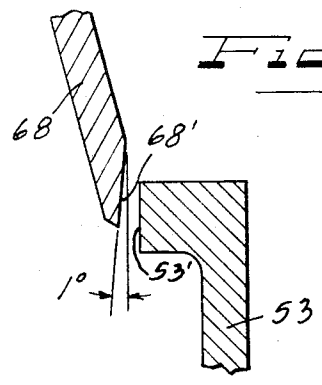


Fig. 9



SLITTER FOR DISPLAY PACKAGES AND SIMILAR PRODUCTS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a slitter for slitting sheets of material and more particularly relates to a slitter having an inclined flat stationary feed bed for enabling sheets to be slit to be gravity fed to slitting stations.

2. Description of the Prior Art

Certain packagers in the United States currently are packaging a wide variety of products on machines that are particularly adapted for making so-called blister-type packages. In a packaging operation of this type a paperboard sheet is die-cut to provide a series of spaced openings and blisters are then formed in the openings which may be made preferably of a transparent synthetic plastic material. Product is then automatically loaded into the open-ended pouches. A second closure sheet is then applied to the upper-side of the die-cut sheet and secured in assembly therewith. It will, therefore, be appreciated that each sheet is formed with a series of filled pouches and the sheet must then be further processed so that the filled pouches can be separated to form separate pouches. Industry commonly uses a so-called "horizontal-type" slitter for cutting the filled pouches apart. Conventionally, packaging machines are provided with a conveyor that transports the product filled sheet to a power driven horizontal infeed conveyor provided on the horizontal slitter. This power driven horizontal infeed conveyor then transports the product filled sheet to the cutting knives and the pouches are then severed from one another. The slitting operation is generally carried out on the same plane as the plane of the horizontal infeed conveyor and is powered by a separate drive.

SUMMARY OF THE INVENTION

In accordance with the principles of the present invention, a new and improved slitter has been provided having a stationary infeed section comprising a gravity feed bed. The slitter also has an improved knife and anvil assembly. The gravity feed bed and the knife and anvil assembly are compactly oriented so as to occupy less overall area than where a separate horizontal infeed conveyor is required as previously described. By providing an inclined feed bed to permit the product to be gravity fed into the knives, it has been found that scrap loss can be almost totally eliminated since the product can be fed through and then drawn through the cutting stations. By providing a construction of this type, the additional chain drive and lugs on the conventional machines now in use can now be eliminated. The conventional horizontal-type slitter having the horizontal infeed conveyor has a scrap loss of 2 percent – 5 percent in contrast with the new slitter here disclosed where field testing has proven that the scrap loss has been reduced to virtually zero. Any suitable material can be used to form the packages to be cut apart.

According to other features of this invention, adjustments for setting up the slitter can be made quickly to enable different sized sheets to be slit in contrast with the horizontal-type slitter previously discussed. Experience in the field has demonstrated that 2 – 4 hours have been required to change over the old horizontal-type slitter for a different sized slitting operation. The new slitter here disclosed can be set up to make a different size cut in a period of time of about **10** minutes.

The slitter herein disclosed also embodies other improved features in regard to the construction of each knife and anvil. As disclosed, the anvil is power driven and its knife engaging face is engaged at an angle of 0°. The associated knife is provided with a holder and the holder is offset at an angle of about ½° and the knife blade has a cutting edge that is formed having a 1° angle. When the knives and the anvils co-act they provide interengaged cutting areas. The knife and anvil are so mounted with respect to one another that when the sheet is fed into engagement with the knife and anvil, a so-called shear cut is generated as opposed to the old-type of crush cut. A crush cut is generated where the knife tracks on top of and in engagement with an upper surface of an anvil.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a slitter embodying the features of our invention and showing a card or sheet in position for slitting;

FIG. **2** is a plan view of the slitter with certain elements shown in section;

FIG. **3** is a vertical cross section through the slitter taken substantially along the line III—III looking in the direction indicated by the arrows as shown in FIG. **2**;

FIG. **4** is an enlarged fragmentary side view of product support guides with the support shafts shown in section;

FIG. **5** is an enlarged fragmentary vertical section of the guides taken substantially along the line V — V looking in the direction indicated by the arrows as seen in FIG. **4**;

FIG. **6** is an enlarged plan view of a cutting assembly with the cutting knife shown in section;

FIG. **7** is a fragmentary side view of the slitter shown in FIG. **1** with certain components shown in dotted lines and with discharge conveyor positioned for transporting product to the slitter.

FIGS. **8** and **9** are diagrammatic views for the purpose of showing the different positions of the cutting knives.

DETAILED DESCRIPTION OF CERTAIN PREFERRED EMBODIMENTS

Reference numeral **10** indicates generally a slitter or a slitting machine for slitting a sheet of material S which embodies our described invention. The slitter is provided with a slitter frame or slitter stand **11.** The slitter stand may be of any suitable construction. As illustrated, the stand **11** is of an open framework box-type modular construction. A series of closure panels such as are illustrated in FIG. **1** at **11***a*, **11***b*, and **11***c* are suitably secured to the frame to enclose the central area of the frame thereby providing an enclosed type housing having a recessed area R at its upper end. The rear panel is not shown.

An inclined flat stationary sheet feed bed of a gravity feed type is suitably mounted on the frame in the recessed area R which bed is indicated generally by the reference numeral **12.** A pair of side plates **13** and **14** are suitably secured to the frame **11** and support means **15** is provided for supporting the bed **12** on the side plates **13** and **14.**

The rail support means **15** comprises a series of spaced horizontal support shafts as indicated by **18** and **19** for supporting each of a series of transversely spaced bed rails **16.** These support shafts are mounted on an inclined plane. The series of transversely spaced inclined rails **16** are fixedly mounted and supported by the aforesaid spaced horizontal shafts **18** and **19** (FIGS. **1** and **3**). To this end, the rails **16** each are provided with a rail support bracket or block **16***a*. Screws **20** are provided to secure the rail to a pair of the associated blocks **16***a*. The blocks **16***a* each have notched edges indicated at **16**b which are mounted in fitted assembly with the shafts **18** and **19.** Set screws **21** are provided to lock the rails in fixed assembly with the supporting shafts. The relative transverse position of the rails **16** can be quickly changed merely by loosening the set screws **16***a*, moving the rails to a new position and resecuring the set screws **21.**

EDGE GUIDE ASSEMBLY

Adjustment means **25** (FIGS. **1** – **3**) are provided to enable web edge guides or guide assemblies **26** — **26** to be moved together or relative to one another, as desired, so that different sized packages can be slit apart from a common sheet. To this end, handwheels **30** — **30** for moving the edge guides are provided. It should be noted that they operate in such a way as to cause the edge guides **26** — **26** to move towards and away from one anohter. A pair of right-hand and left-hand drive screws or stub shafts or adjustable bars **27** — **27** are mounted on sleeve bearings **28** — **28** in the side frame plates **13** and **14.** The inner adjacent ends **27***a* — **27***a* of the stub shafts **28** — **28** are connected by a sleeve-type coupling **29.** The handwheels **30** — **30** are mounted at the outer ends of the stub shafts **27** — **27** on the outer sides of the side plates **13** and **14.** One stub shaft has a left-hand thread, and the other stub shaft has a right-hand thread.

When the coupling **29** is disengaged, either of the stub shafts **27** — **27** can be rotated by turning the associated handwheel **30** — **30** to cause the associated edge guide **26** to move independent of the other edge guide **26** thereby to vary the position of one of the edge guides **26** with respect to the other. Similarly, the other hand-wheel **30** can be operated to cause the independent movement of the opposite edge guide **26.** After the proper adjustment is made, the coupling **29** is then secured in fixed relationship to the adjacent ends **27***a* — **27***a* of the stub shafts thereby locking them together by the operation of set screws **31** (FIG. **2**). In order to further support the stub shafts **27** — **27,** and to permit relative lateral or transverse movement of each of the edge guides **26,** the screw threads are engaged in threaded bores or holes **32***a* — **32***a* in a pair of guide support blocks **32** — **32.**

In view of the foregoing it will be appreciated that the guide assemblies **26** are each of a similar construction and a description of one will suffice for both of them. More particularly, the guide assembly **26** includes an edge guide plate **33** having an enlarged flared flange portion **34** and a reduced end portion **35** having a length in excess of the length of the rails **16.** The enlarged flange portions **34** — **34** project upwardly beyond the upper ends of the rails to permit the product S to be guided onto the rails by an infeed conveyor **3***b* (FIG. **7**).

In order to secure the flange portions **34** to the blocks **32,** flanged edge guide rails **37** are provided. As stated, each of the flanged edge guide rails **37** include a flange **38** secured by four screws **39** to the associated block **32.** The flange **38** has notched edges **40** — **40** and **41** which are formed so as to be free of the support shafts **18** and **19** and the screw adjustment mechanism **25** including the stub shafts **27** — **27.**

A series of screws **42** and **43** are provided to secure the flanged edge guide rails **37** to the edge guide plate **33** — **33.**

With certain types of so-called cards where heavier product is carried in the "blisters" it is desirable to provide additional support at the area of the "blisters" as the cards are passing through the slitter. To this end, product support rails **44** can be positioned alongside of the rails **16** as shown in FIGS. **4** and **5.** These product support rails are provided with mounting pins **45** that project through the rail blocks **16**a and are secured in place by set screws **46** (FIG. **4**). It will thus be seen that these accessory rails can be quickly installed and removed, as desired.

KNIFE ASSEMBLY

A slitter knife assembly or cutting means **50** is provided as best shown in FIGS. **1,2,3,** and **6** – **9.**

The knife assembly **50** includes a series of transversely spaced pairs of knives and anvils with each pair indicated generally at **51.** The knives and anvils are identified at **52** and **53.**

As is seen in FIG. **2,** the anvils **53** are mounted by keys **53***a* on a common drive shaft **54** supported at opposite ends on bearings **55** — **55** carried by the side plates. A pulley **56** is mounted on the drive shaft. Mounted on a support base portion of the frame **11** is a motor **57** having a drive pulley **58** connected by a V-belt **59** to the pulley **56.** An electrical control **60** (FIG. **1**) is provided for operating the motor. The knives are each individually mounted on a knife support shaft or bar **61.** The knife support bar is fixedly secured at opposite ends to the side plates **13** and **14** in underlying relation with respect to the lower ends of the rails **16.**

In order to mount the knife assembly **50** on the knife support bar it will be noted in FIGS. **3** and **6** that a knife support arm **62** has been provided. The knife support arm **62** has a split end **63** which is engaged about the knife support shaft **61.** Each arm is also provided with a screw **64** for clamping the split end **63** of the support arm in unitary relationship with the knife support bar **61.** It will, thus, be seen that the position of the knife assembly can be quickly changed with respect to the knife support shaft or bar **61** merely by the adjustment of the screw **64,** the movement of the knife assemblies **61** and the resecurement of the screw **64** after the knife assemblies have been moved to a new position. Each of the knives **52** has a knife hub **65** with an outer annular recessed area **66** providing a knife mounting shoulder **67.** An annular knife blade **68** is carried on the shoulder. An annular ring spring **69** is mounted on one side of the blade **68** and an annular retaining ring **70** is secured in a recess **71** on an opposite side of the blade **68.** As shown in FIGS. **8** and **9** it will be seen that the knife blade **68** is preferably provided with a bevel cut cutting edge **68'**. Preferably, the cutting edge has a 1° bevel so that it can co-act with a flat anvil edge surface **53'**. In addition, as shown in FIG. **6,** the knife blade **68** and the knife hub **69** are carried on a knife support shaft **72**

that is in turn rotatably mounted on an inner end of the knife support arm **62.** The knife hub is mounted at a 1 ½° angle relative to the axis of the knife support shaft **72** so that the total opposite angle of the knife is 1 ½°. The 1 ½° opposite angle provided on the cutting knife is believed to be a significant improvement over the old techniques now employed by industry in connection with the machines now used for the slitting of cards of this type. By offsetting the knife blade at a 1 ½° angle with respect to the anvil a shear cut can be secured. It is in this manner that the knife can be caused to co-act with the anvil in such a way that virtually no scrap is generated as a result of the operation of the knife and anvil assembly. By disposing the knife blade and anvil in the manner illustrated in FIGS. **8** and **9,** the knife blade cutting edge is "self-sharpening".

The slitter **10** is adapted to slit a finished packaged product to separate one product from another. The product can be packaged in "blisters," pouches or in any suitable manner with any suitable material. The slitter can operate to slit leather, plastic, paper, cardboard, thin sheet metal having a thickness of the order of 0.002 – 0.003 inch and the like.

In the preferred embodiment as illustrated in the drawings, the inclined rails **16** are preferably mounted at an angle of 30°. This angle can be varied depending upon the weight of the product and the product S to be slit.

In operation, the slitter machine **10** is self-feeding and as the cards are conveyed by the infeed conveyor **37** to the rails **16,** the cards then fall by gravity on to the upper ends of the rails **16** and the weight of the cards carry them to the knife and anvil a ssembly where they are then slit. These sheets S are spaced apart on the conveyor **37** and are consecutively transported and dropped on to the rails. Desirably, the spacing between the cards on the conveyor **37** is maintained so that the cards will not be bunched together as they are fed along the inclined rails **16** to the cutting knives. Each of the knives has a knife support guard **73** carried by the arm **62** for enclosing an upper end of the knife blade **68.** It will also be noted that lower end of the knife blade projects through a rail opening **16'.** The anvil is disposed beneath the rail **16** and beneath the knife opening **16'** in engagement with the knife blade. After the sheet has been slit, the severed packages are supported by the lower ends of the rails and are allowed to drop into boxes or on to another conveyor for final cartoning.

We claim as our invention:

1. A slitter for slitting sheets of material comprising

a frame,

an inclined flat stationary sheet feed bed fixedly mounted on said frame including a series of transversely spaced inclined rails each having a rotary knife opening intermediate its upper and lower ends,

cutting means at each of said knife openings comprising a rotary knife and an anvil supported on said frame with said cutting means being aligned with said knife opening for slitting the sheet as it moves downwardly from the upper ends of the rails across said knife openings and with the rails at the lower ends supporting the slit sheet after being cut by said cutting means,

means for transversely adjusting the rails and the cutting means, and,

means for driving said anvils.

2. The slitter of claim **1** further characterized by inclined product support means positioned between said inclined rails providing product support means which product is carried on the sheet being slit.

3. The slitter of claim **1** further characterized by a knife support bar supported at opposite ends by said frame in overlying relation with respect to the lower ends of said rails, and mounting means carried by said support bar providing a cantilever support for each of said rotary knives.

4. The slitter of claim **1** further characterized by said means for driving said anvils comprising a motor mounted on said frame, a drive pulley operatively connected to said anvils, and means connecting said motor and said pulley in driving relation.

5. The slitter of claim **1** further characterized by said anvil knife having a flat surface being mounted at a 1 ½° angle in offset relation to said upper slitting knife and with the upper slitting knife being mounted and operationed to force the paper into contact with said flat surface on said anvil knife, whereby a self-sharpening action is attained to enable the knife and anvil to co-act to produce a shear cut.

6. The slitter of claim **1** further characterized by each of said rails having a knife opening intermediate its upper and lower ends and with the associated knife and anvil assembly being aligned with said knife opening thus permitting the sheet to be slit as it passes over said knife openings in said rails.

7. The slitter of claim **1** further characterized by said bed having a pair of sheet edge guides at transversely opposite sides of the bed enabling prescribed areas of each sheet to be conveyed into a cutting zone defined by said cutting means.

8. The slitter of claim **7** further characterized by means for moving each of said edge guides independently of one another in directions towards and away from one another.

9. The slitter of claim **7** further characterized by means for moving said edge guides transversely relative to the frame in selected adjusted positions relative to said knife and anvil.

10. A slitter for slitting sheets of material comprising:

a frame,

an inclined flat stationary sheet feed bed fixedly mounted in an inclined position on said frame including a series of transversely spaced inclined rails each having upper and lower ends,

cutting means co-operative with each of said rails comprising a rotary knife and an anvil supported on said frame with said cutting means being operable for slitting the sheet as it moves downwardly from the upper ends of the rails in a direction toward the lower ends of the rails, and

means for casusing said knives and anvils to be driven relative to one another for cutting the sheets,

each of said rails being provided with adjustable mounting means to permit the rails to be individually moved transversely of the bed and said knives and anvils each being provided with adjustable mounting means to enable each of them to be shifted and moved transversely of the bed independently of one another to minimize set-up time.

11. A slitter for slitting sheets of material comprising

a frame,

an inclined flat stationary sheet feed bed fixedly mounted in an inclined position on said frame including a series of transversely spaced inclined rails each having upper and lower ends,

cutting means co-operative with each off said rails comprising a rotary knife and an anvil supported on said frame with said cutting means being operable for slitting the sheet as it moves downwardly from the upper ends of the rails in a direction toward the lower ends of the rails, and

means for causing said knives and anvils to be driven relative to one another for cutting the sheets;

edge guides being disposed at opposite sides of said bed, and means co-operable with said edge guides enabling the edge guides to be moved simultaneously toward and away from one another when said edge guides are interconnected and enabling said edge guides to be moved independently of one another when said edge guides are disengaged from one another.

12. A slitter for slitting sheets of material comprising a frame,

an inclined flat stationary sheet feed bed fixedly mounted in an inclined position on said frame including a series of transversely spaced inclined rails each having upper and lower ends,

cutting means co-operative with each of said rails comprising a rotary knife and an anvil supported on said frame with said cutting means being operable for slitting the sheet as it moves downwardly from the upper ends of the rails in a direction toward the lower ends of the rails,

means for causing said knives and anvils to be driven relative to one another for cutting the sheets,

each of said rails being provided with adjustable mounting means to permit the rails to be individually moved transversely of the bed and said knives and anvils each being provided with an adjustable mounting means to enable each of them to be shifted and moved transversely of the bed independently of one another to minimize set-up time, and

a knive support bar being mounted on the frame and overlying a lower end of said infeed section, knife support arms mounted as cantilevers from said support bar with said knives mounted thereon, and adjustable means connecting said arms to said bar permitting said arms to be mounted in selected positions along the length of said bar.

* * * * *